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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/066,529	01/31/2002	Ronald A. Askeland	100201207-1	3681

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EXAMINER	
NGUYEN, LAM S	

ART UNIT	PAPER NUMBER
2853	

DATE MAILED: 09/22/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/066,529	ASKELAND ET AL.	
	Examiner	Art Unit	
	LAM S NGUYEN	2853	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 August 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *31 January 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. Claims 1-8, 10, 12-19, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barbour et al. (EP 1029674 A2) in view of Nozawa (US 6499821).

Barbour et al. disclose a temperature control system for an inkjet printhead assembly, comprising:

Referring to claims 1, 2, 12:

a printhead assembly having ink ejection elements energizable by an electrical pulse having an amplitude and pulse width (*FIG. 27*);

a sensor coupled to the printhead assembly for generating a signal representative of the printhead temperature (*FIG. 1B, element 140*);

a memory device configured to store an optimal operating temperature of the printhead derived from current printhead operating parameters (*column 5, lines 30-50: "optimal operating ranges, such as temperature"*), a thermal response model of the printhead assembly (*column 5, lines 30-50: The data processor 124 dynamically formulates and performs its own firing and timing operations for regulating the temperature*);

a controller (*FIG. 1B, element 124*) configured to read a nominal operating pulse

width (*column 34, lines 1-6: "the desired pulse width"*), the signal from the sensor (*column 5, lines 39-45: "sensed printhead temperature"*), the optimal operating temperature (*column 5, lines 39-45: "optimal operating ranges, such as temperature"*), and the printhead operating parameters from the memory device (*column 33, lines 19-29 and FIG. 24: "an optimal calibration value for the electrical characteristics of each section is calculated" and column 5, lines 23-30: "the printhead memory device 122 can store various printhead specific data, including printhead identification data, warranty data, printhead characterization data, printhead usage data, etc."*) for calculating an adjusted pulse width (FIG. 26-27); and

a firing controller with an ejection sequence sub-controller configured to dynamically and selectively control the sequence of fire pulses, a firing delay sub-controller for reducing electromagnetic interference in the printhead assembly (*FIG. 1B, element 152*) and a fractional delay sub-controller for compensating for scan axis directionality errors of the printhead assembly (*FIG. 1B, element 154*).

Barbour et al. do not disclose wherein the controller is configured to read an ejection history of the ejection elements stored in the memory device for calculating the adjusted pulse width and to create a dynamic estimate of a current temperature distribution across the printhead assembly.

Nozawa discloses a printing apparatus having a controller controls a timing of ink ejection from a printing head and an amount of ink ejected by adjusting a width of drive pulses accordance to a use history of the printing head stored in a memory (*Abstract*), wherein the memory "for accumulating storing the number of the drive signals from the start of the initial uses of the print head as data related to the use history" (*column 3, lines 14-19*) and "for storing a

temperature history from an operation start of the printing head as the data related to the uses history" (*column 3, lines 23-26*). In addition, the controller is configured to estimate a current temperature from a driven condition of the ejecting portion that dynamically changes, such as an energy level, a driving period, or a driving frequency of the drive pulse *(FIG. 8 and column 6, lines 39-46)* and temperature sensing means that detects temperature across the printhead when the head unit is constructed to be capable of detecting temperature of each nozzle or each group of a predetermined number of nozzles *(column 9, line 65 to column 10, line 2)*.

Therefore, it would have been obvious for one having ordinary skill in the art at the time the invention was made to modify the printing apparatus disclosed by Barbour et al. such as adjusting the width of the firing pulses is also based on the ejection history of the printhead as disclosed by Nozawa. The motivation of doing so is to "maintain a stable image quality by adequately preventing ejecting characteristics and dot forming locations on a printing medium from being varied due to a use history of the print head" as taught by Nozawa (Abstract).

Babour et al. also disclose the following claimed invention:

Referring to claims 3, 13, 14: wherein the controller is located on at least one of the printhead or externally on a printer (FIG. 1B, element 124).

Referring to claims 4-5, 15-16: (Assumed that "the pulse width calibration data" is already cited in claim 1) wherein the controller reads the nominal operating pulse width and the pulse width calibration data from a memory located on the printhead assembly or the printer (column 33, lines 26-29: "the optimal calibration values are stored in the memory device of the printer of the printhead assembly").

Referring to claims 7, 18: further including an analog to digital converter for generating a digital format of the measured analog signal (FIG. 28, element 2810).

Referring to claims 10, 21: (Assumed that "the pulse width calibration data" is already cited in claim 1) wherein the pulse width calibration data is in the form of an equation (column 5, lines 30-50: "the data processor 124 to dynamically formulate and perform its own firing and timing operations for regulating the temperature of").

Referring to claims 6, 8, 17, 19: wherein the temperature sensor is analog temperature sensor or a digital temperature sensor (column 39, lines 49-53 and column 23-28).

3. Claims 9 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barbour et al. (EP 1029674 A2) in view of Nozawa (US 6499821), as applied to claims 1 and 12, and further in view of Saito (US 6068363).

Barbour et al., as modified, disclose the claimed invention as discussed above, except wherein the temperature sensor including multiple temperature sensors distributed around the printhead so as to provide global measurement of the printhead temperature.

Saito discloses a printing apparatus "in which temperature sensors and heaters provided to a plurality of elemental substrates can be controlled so that temperature control of each substrate can be appropriately performed" (column 3, lines 11-16), wherein the temperature sensor including multiple temperature sensors distributed around the printhead (FIG. 1, elements 2).

Therefore, it would have been obvious for one having ordinary skill in the art at the time the invention was made to modify the printing apparatus disclosed by Barbour et al., as modified, such that including multiple temperature sensors distributed around the printhead so as to

provide global measurement of the printhead temperature as disclosed by Saito. The motivation doing so is that temperature control can be performed at precision higher in order to obtain higher image quality, to prevent density irregularities, and to improve the operation reliability as taught by Saito (column 3, lines 40-49).

4. Claims 11 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barbour et al. (EP 1029674 A2) in view of Nozawa (US 6499821), as applied to claims 1 and 12, and further in view of Wade et al. (US 5682185).

Assumed that "the pulse width calibration data" is already cited in claim 1, the rejection is made as follows:

Barbour et al., as modified, disclose the claimed invention as discussed above except wherein the pulse width calibration data is in a look-up table.

Wade et al. disclose an ink jet printer having a look-up table containing a target operating energy and pulse width (column 6, lines 59-60) so that "the operating energy of the printhead is determined form the look-up table and the target power is determined form the target pulse width" (Abstract).

Therefore, it would have been obvious for one having ordinary skill in the art at the time the invention was made to modify the printing apparatus disclosed by Barbour et al., as modified, such that including a look-up table to contain the pulse width calibration data as disclosed by Wade et al. The motivation of doing so is to allow "the setting of the operating energy at a value greater than the turn on energy, but within a range that insures proper print quality while avoiding premature failure of the heater resistors" as taught by Wade et al. (column 6, lines 35-40).

Response to Arguments

Applicant's arguments filed 08/06/2004 have been fully considered but they are not persuasive.

The applicants argued that the cited references do not disclose or allow for the possibility of using a nominal operating pulse width, the signal from the sensor, the optimal operating temperature, the ejection history of the ejection elements and the printhead operating parameters from the memory device for calculating an adjusted pulse width and to create a dynamic estimate of a current temperature distribution across the printhead assembly. As discussed above, the examiner points out that Nozawa disclose the controller configured to estimate a current temperature from a driven condition of the ejecting portion that dynamically changes, such as an energy level, a driving period, or a driving frequency of the drive pulse *(FIG. 8 and column 6, lines 39-46)* and temperature sensing means that detects temperature across the printhead when the head unit is constructed to be capable of detecting temperature of each nozzle or each group of a predetermined number of nozzles *(column 9, line 65 to column 10, line 2)*. Therefore, Nozawa discloses the above claimed limitation.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after

the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LAM S NGUYEN whose telephone number is (571)272-2151. The examiner can normally be reached on 7:00AM - 3:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, STEPHEN D MEIER can be reached on (571)272-2149. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

LN
September 13, 2004

HAI PHAM
PRIMARY EXAMINER